VOLTAGE MONITORING AND SEQUENCING

ANALOG DEVICES APPLICATIONS BULLETIN 2009/2010

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ADI Introduces a New Family of Ultralow Power Supervisory Circuits

The ADM6326, ADM6328, ADM6346, and ADM6348 are ultralow power microprocessor supervisory circuits suited to monitoring the power supplies in portable microprocessor-based applications. This new family of ultralow power supervisory circuits extend the battery life of portable devices by only consuming 500 nA (typ) supply current while maximizing product reliability through robust power supply monitoring.

Ultralow 500 nA supply current
Reset thresholds available from 2.2 V to 4.63 V
100 ms (min) power-on reset pulse width
Three versions: push-pull active low, push-pull active high, and open-drain active low
Fully specified over temperature
3-lead SOT-23 package, no external components required
ADM6326

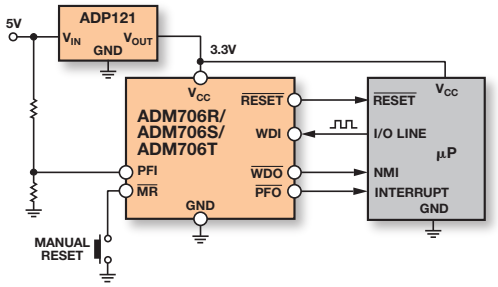
Part Number	Reset Threshold (V)	Min Reset Timeout (ms)	Reset Output Stage Active Low	Supply Current Typ (µA)	Package	Price[1] ($U.S.)
ADM6326, ADM6328	2.2, 2.32, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08	100	ADM6326: push-pull ADM6328: open-drain	0.5	3-lead SOT-23	0.95
ADM6346, ADM6348	3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.38, 4.5, 4.63	100	ADM6346: push-pull ADM6348: open-drain	1	3-lead SOT-23	0.95

[1]1000 to 4999

Simple Reset/Power-On Reset

Analog Devices offers an extensive range of reset generator circuits designed for use in microprocessor-based systems to monitor power supply voltage levels from 1.8 V to 5 V. Their reset output signals are asserted whenever the supply voltage falls below a preset threshold level.

A number of these devices offer a manual reset input, allowing a user to safely reset a microprocessor system by means of an external push-button switch.



Part Number	Reset Threshold (V)	Min Reset Timeout (ms)	Reset Output Stage		Manual Reset Capability	Supply Current Typ (µA)	Package	Price[1] ($U.S.)
			Active Low	Active High				
ADM1810	4.35, 4.62	100	Push-pull	—	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1811	4.35, 4.62	100	Internal pull-up	—	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1812	4.35, 4.62	100	—	Push-pull	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1813	4.35, 4.62	100	Internal pull-up	—	Yes	4	3-lead SC70, 3-lead SOT-23	0.39
ADM1815	2.18, 2.31, 2.55, 2.88, 3.06	100	Push-pull	—	No	4	3-lead SC70, 3-lead SOT-23	0.39
ADM1816	2.18, 2.31, 2.55, 2.88, 3.06	100	Internal pull-up	—	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1817	2.18, 2.31, 2.55, 2.88, 3.06	100	—	Push-pull	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1818	2.18, 2.31, 2.55, 2.88, 3.06	100	Internal pull-up	—	Yes	4	3-lead SC70, 3-lead SOT-23	0.45
ADM6315	2.63, 2.93, 3.08, 4.39, 4.5, 4.63	1, 20, 140, 1120	Open-drain	—	Yes	4	4-lead SOT-143	0.73
ADM6319	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	Push-pull	Yes	5	5-lead SOT-23	0.50
ADM6322	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Open-drain	Push-pull	Yes	5	5-lead SOT-23	0.50
ADM6326	2.2, 2.32, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08	100	Push-pull	—	No	0.5	3-lead SOT-23	0.95
ADM6328	2.2, 2.32, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08	100	Open-drain	—	No	0.5	3-lead SOT-23	0.95
ADM6346	3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.38, 4.5, 4.63	100	Push-pull	—	No	1	3-lead SOT-23	0.95
ADM6348	3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.38, 4.5, 4.63	100	Open-drain	—	No	1	3-lead SOT-23	0.95
ADM6384	1.58, 1.67, 2.19, 2.31, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	—	Yes	3	4-lead SC70	0.94
ADM6711	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	—	Yes	12	4-lead SC70	0.26
ADM6713	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	Yes	12	4-lead SC70	0.28
ADM6825	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	Yes	7	5-lead SOT-23	0.50
ADM698	4.65	140	Push-pull	Push-pull	No	600	8-lead PDIP, 16-lead SOIC	1.35
ADM707	4.65	160	Push-pull	Push-pull	Yes	190	8-lead PDIP, 8-lead SOIC	0.96
ADM708	4.4	160	Push-pull	Push-pull	Yes	190	8-lead PDIP, 8-lead SOIC, 8-lead MSOP	0.84
ADM709	2.63, 2.93, 3.08, 4.4, 4.65	140	Push-pull	—	No	35	8-lead PDIP, 8-lead SOIC	0.70
ADM803	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	No	17	3-lead SC70	0.26
ADM809	2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	140	Push-pull	—	No	17	3-lead SC70, 3-lead SOT-23	0.61
ADM810	2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	140	—	Push-pull	No	17	3-lead SC70, 3-lead SOT-23	0.60
ADM811	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull		Yes	5	4-lead SOT-143	0.45
ADM812	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	—	Push-pull	Yes	5	4-lead SOT-143	0.45
ADM825	2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	Yes	5	5-lead SC70, 5-lead SOT-23	0.50
ADM8698	4.65	140	Push-pull	Push-pull	No	70	8-lead PDIP, 8-lead SOIC_N, 16-lead SOIC_W	1.99

[1]1000 to 4999

Watchdog Supervisory Circuits

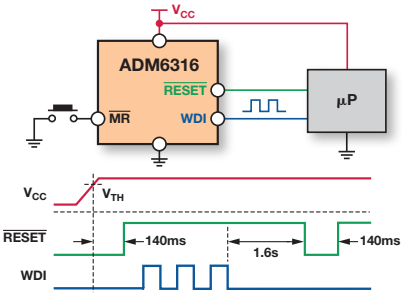
Microprocessors need to be reset when code execution errors occur, as well as when supply voltages fall to invalid levels. A watchdog function can detect code execution errors by monitoring logic transitions on a microprocessor's output pin. If the transitions are not frequent enough, the watchdog circuit initiates a reset, taking the microprocessor out of its invalid state.

Many ADI reset generator watchdog circuits also feature a power-fail detection comparator that asserts an active low signal when the unregulated power supply voltage falls below a predetermined level. This power-fail output can be used to generate a nonmaskable interrupt, which allows the microprocessor to implement a shutdown procedure before power is lost.

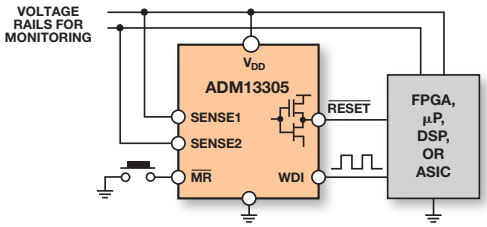
APPLICATIONS

- Microprocessor systems
- Intelligent instruments
- Portable instruments
- PLCs
- Medical
- Energy metering
- Consumer

ADM6316 Single Channel Supervisor with Watchdog Timer



ADM13305 Dual Voltage Monitor with Watchdog Timer



Supervisory—Watchdog Timers

Part Number	Reset Threshold (V)	Min Reset Timeout (ms)	Reset Output Stage		Manual Reset Capability	Typ Watchdog Timeout (ms)	Power-Fail Indicator	Package	Price[1] ($U.S.)
			Active Low	Active High					
ADM1232, ADM1232A	4.37, 4.62	250	Open-drain	Push-pull	Yes	150/600/1120	No	8-lead PDIP, 8-lead SOIC, 16-lead SOIC_W, 8-lead MSOP	0.94
ADM6316	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	—	Yes	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6318	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	Push-pull	No	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6320	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Open-drain	—	Yes	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6321	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Open-drain	Push-pull	No	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6821	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	—	Push-pull	Yes	1600	No	5-lead SOT-23	0.75
ADM6822	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	Yes	1600	No	5-lead SOT-23	0.75
ADM6823	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	—	Yes	1600	No	5-lead SOT-23	0.75
ADM6824	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	No	1600	No	5-lead SOT-23	0.75
ADM699	4.65	140	Push-pull	Push-pull	No	1600	No	8-lead PDIP, 16-lead SOIC	1.66
ADM705	4.65	160	Push-pull	—	Yes	1600	Yes	8-lead PDIP, 8-lead SOIC	1.01
ADM706	4.4	160	Push-pull	—	Yes	1600	Yes	8-lead PDIP, 8-lead SOIC	1.68
ADM823	2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	—	Yes	1600	No	5-lead SC70, 5-lead SOT-23	0.50
ADM824	2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	Yes	1600	No	5-lead SC70, 5-lead SOT-23	0.50
ADM8616	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	1, 20, 140, 1120	Push-pull	—	No	6.3/102/1600	No	4-lead SC70	0.85
ADM8617	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	1, 20, 140, 1120	Open-drain	—	No	6.3/102/1600	No	4-lead SC70	0.85
ADM8699	4.65	140	Push-pull	Push-pull	No	1600	No	8-lead PDIP, 8-lead SOIC_N, 16-lead SOIC_W	1.99
ADM9690	4.31	10 typ, 50 typ	Push-pull	—	No	0.75/1.5/12.5/25	No	8-lead SOIC	1.50
ADM13305	2.93 and 1.68, 2.93 and 2.25, 4.55 and 2.93, 2.93 and 0.6 (adj), or 2.25 and 0.6 (adj)	140	Push-pull	Push-pull	Yes	1600	No	8-lead SOIC_N	0.95

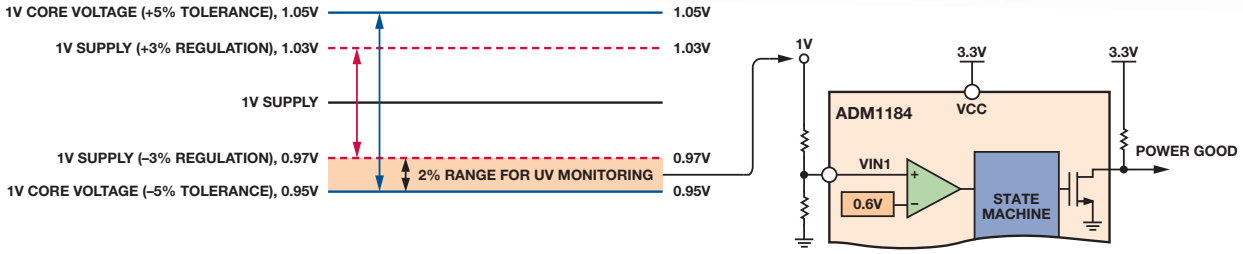
[1]1000 to 4999

ANALOG DEVICES

Multivoltage Monitors

Analog Devices offers a portfolio of multivoltage monitors suited to monitoring two, three, or four supplies. There are several device families offering combinations of positive and negative pretrimmed thresholds and user adjustable inputs, with some including a watchdog timer function. With up to twice the threshold accuracy over temperature of competitive parts, these new ADI products offer the ability to monitor emerging low voltage core requirements and, therefore, maximize system protection.

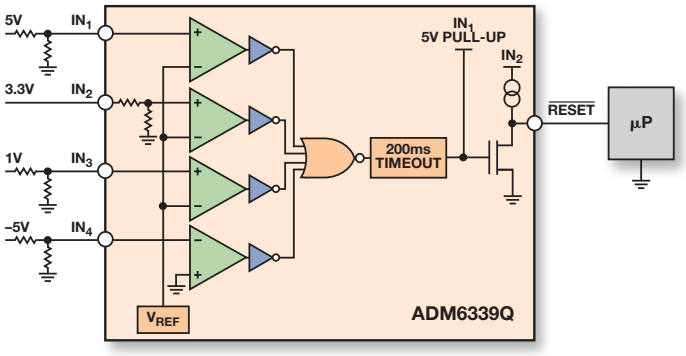
High Accuracy Is Critical When Monitoring Low Voltages



In this example a 1 V regulated supply produces a voltage that varies between 0.97 V and 1.03 V. The core voltage acceptable is 1 V (±5%), that is, 0.95 V to 1.05 V. This results in a range of just 2.0% for UV monitoring. The high ±0.8% accuracy of the ADM1184 along with ±0.1% accurate resistors in the voltage divider at VINx combine to allow accurate monitoring of the undervoltage level within this 2% range.

ADM6339 Quad Voltage Monitor Features

- Monitors positive and negative supplies
- Factory set threshold options:
  –5 V, 1.8 V, 2.5 V, 3.0 V, 3.3 V and 5 V
- Adjustable input threshold options:
  –0.5 V, 0.62 V, 1.23 V



Multivoltage Supervisors

Part Number	Number of Monitored Voltages	Reset Threshold (V)	Adjustable Accuracy	Min Reset Timeout (ms)	Reset Output Stage		Manual Reset Capability	Typ Watchdog Timeout (ms)	UV and OV Monitor	Package	Price ($U.S.)[1]
					Active Low	Active High					
ADM13305	2	0.6 (adj), 1.68, 2.25, 2.93, 4.55	±0.8%	140	Push-pull	Push-pull	Yes	1600	—	8-lead SOIC_N	0.95
ADM13307	3	0.6 (adj), 1.25 (adj), 1.68, 2.25, 2.93, 4.55	±0.8%	140	Push-pull	Push-pull	Yes	—	—	8-lead SOIC_N	0.98
ADM6710	3 or 4	0.62 (adj), 1.58, 1.67, 2.19, 2.32, 2.63, 2.78, 2.93, 3.08, 4.38, 4.63	±1.5%	140	Open-drain	—	—	—	—	6-lead SOT-23	1.60
ADM1184	4	0.6 (adj)	±0.8%	100	Open-drain	—	—	—	—	10-lead MSOP	2.39
ADM6339	4	–0.50 (adj), 0.62 (adj), 1.23 (adj), –4.38, –4.63, 1.58, 2.19, 2.63, 2.78, 2.93, 3.08, 4.38, 4.63	±0.8%	140	Open-drain	—	—	—	—	6-lead SOT-23	1.79
ADM2914	4	0.5 (adj)	±1.5%	Adj	Open-drain	—	—	—	Yes	16-lead QSOP	3.99
ADM12914	4	0.5 (adj)	±0.8%	Adj	Open-drain	—	—	—	Yes	16-lead QSOP	4.99

[1]1000 to 4999

ADM12914 and ADM2914 Quad UV/OV Positive/Negative Voltage Supervisors

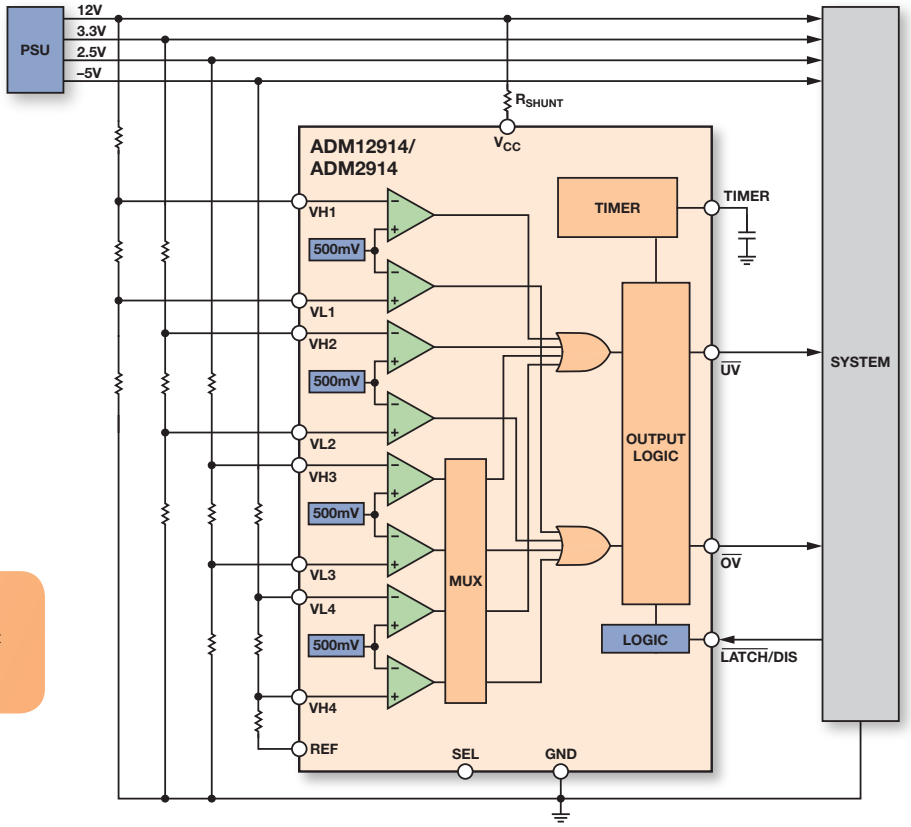
These flexible voltage monitors simplify monitoring of both positive and negative voltage rails. Up to four rails can be monitored for both undervoltage and overvoltage conditions. The ADM2914 and ADM12914 are configured simply using a few resistors.

Features

- Quad UV/OV positive/negative supervisor
- Supervises up to 2 negative rails
- Adjustable UV and OV input thresholds
- An internal shunt regulator enables the device to be powered via higher voltages
- Industry-leading threshold accuracy
  - ADM12914: ±0.8% (–40°C to +125°C)
  - ADM2914: ±1.5% (–40°C to +85°C)
- 1 V buffered reference output
- Open-drain $\overline{UV}$ and $\overline{OV}$ reset outputs
- Adjustable reset timeout with disable option
- Outputs guaranteed down to V_{CC} of 1 V
- Glitch immunity
- 16-lead QSOP package

APPLICATIONS

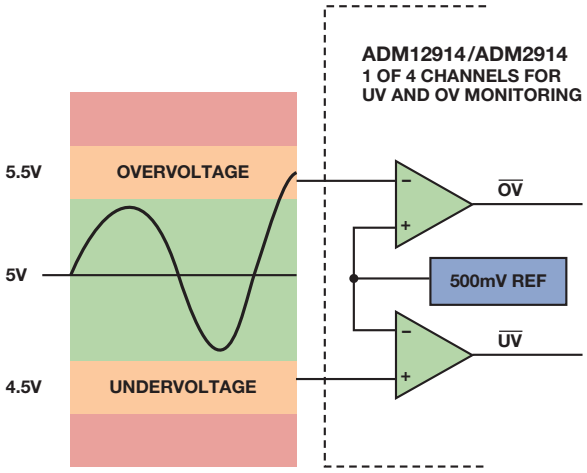
- Server supply monitoring
- FPGA/DSP core and I/O voltage monitoring
- Telecommunications equipment
- Medical equipment



The ADM12914 detects overvoltage and undervoltage (OV/UV) conditions with 1.5 times the accuracy (±0.8% over temperature) of competing supervisory circuits.

This translates into improved system operation as the new supervisory IC prevents power supplies from slipping out of range in medical ultrasound, telecommunications equipment, and other applications.

This is especially important in today's power supply systems, which often operate at below 1 V and where an overvoltage condition could cause catastrophic system failures. The ADM2914/ADM12914 also includes an input-supply shunt regulator that enables the device to be run off of higher voltage supplies, including 12 V operation in communications infrastructure equipment and lithium-ion batteries used in hybrid vehicles.



ADM12914/ADM2914 detecting an overvoltage event.

ADM1184 and ADM1185: ±0.8% Accuracy Quad Voltage Monitor and Sequencer

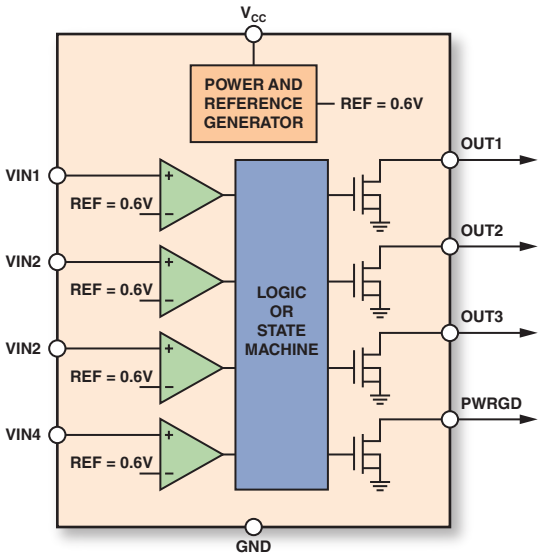
The ADM1184 and ADM1185 each combine four accurate comparators with sequencing logic or a state machine to provide a complete monitoring and sequencing solution for four voltage rails. External resistor dividers allow user programmability of the voltage thresholds to be monitored to a minimum of 0.6 V, with ±0.8% accurate comparators ensuring voltage rails are monitored to the highest possible accuracy.

Each output enable on the ADM1184 depends only on the undervoltage state of the corresponding input. In the ADM1185, a state machine ensures the output enables always turn on in the correct sequence. Both the ADM1184 and ADM1185 provide a power-good output that goes high 190 ms after all supplies are above the undervoltage threshold.

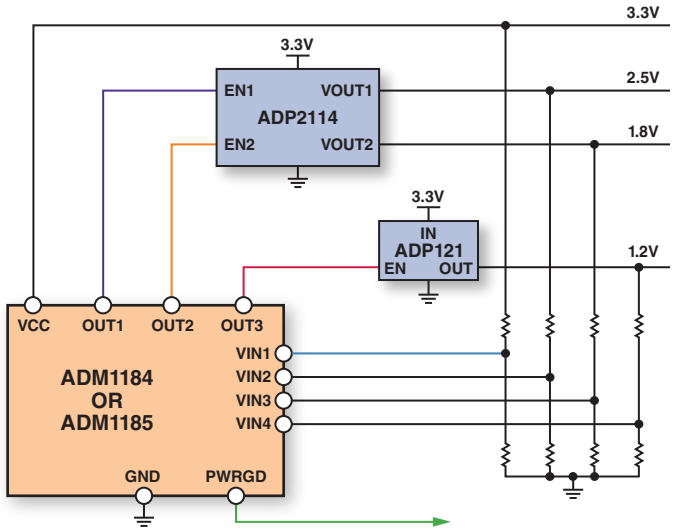
Features

- 4 accurate comparators
  - Accuracy: ±0.8%
  - 0.6 V references
  - Trip points set with external resistors
- 4 open-drain outputs
  - 3 enable outputs for regulators
  - 1 power-good (PWRGD) output
  - Outputs valid for V_{CC} as low as 1 V
- Power-up sequencing:
  - Internal delay on OUT1 = 190 ms (ADM1185 only)
  - Internal delay on PWRGD = 190 ms
- V_{CC} supply range: 2.7 V to 5.5 V
- 10-lead MSOP
- Multiple parts can be cascaded for extended monitoring/sequencing

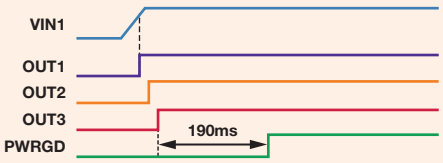
Functional Block Diagram



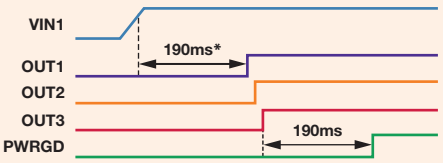
Applications Diagram



ADM1184 Timing Diagram



ADM1185 Timing Diagram



*190ms DELAY ASSOCIATED WITH THE ASSERTION OF OUT1 ALLOWS THE VOLTAGE MONITORED BY VIN1 TO SETTLE BEFORE POWERING ON THE OTHER RAILS.

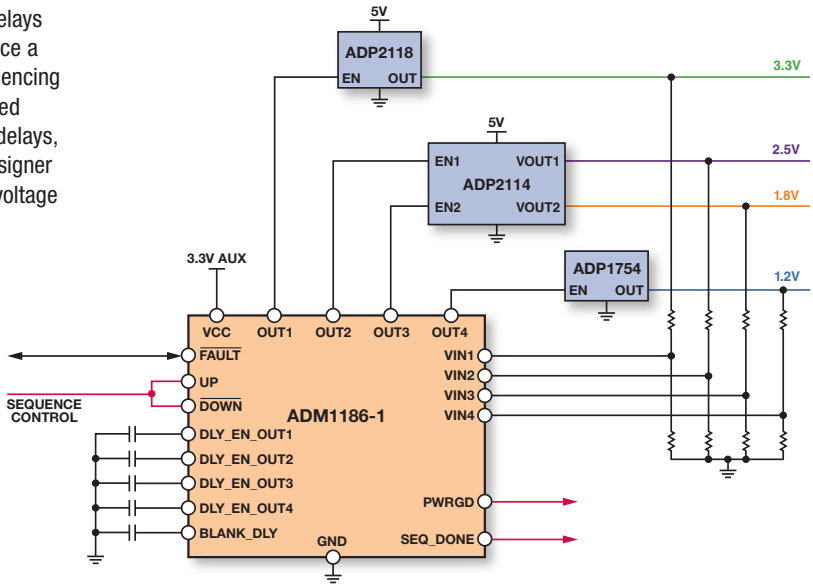
ADM1186: Quad Channel Up and Down Power Supply Sequencers and Monitors

The ADM1186 family provides the same high ±0.8% monitoring accuracy as the ADM1184 and ADM1185, but add a number of features to provide designers with additional functionality and flexibility. The ADM1186 are able to perform up and down power supply sequencing, and in the case of the ADM1186-1, multiple devices can be cascaded together to sequence up and down 8, 12, 16, or even more supplies.

Dedicated capacitor programmable timing pins allow the time delays between supplies to be easily controlled without the need to place a capacitor on the supply rail monitoring pin. This allows the sequencing time delay and fault response time of the device to be controlled independently and accurately. In addition to the sequence time delays, a programmable blanking time delay is provided to allow the designer to set a maximum time limit for a supply to rise above its undervoltage threshold after being enabled.

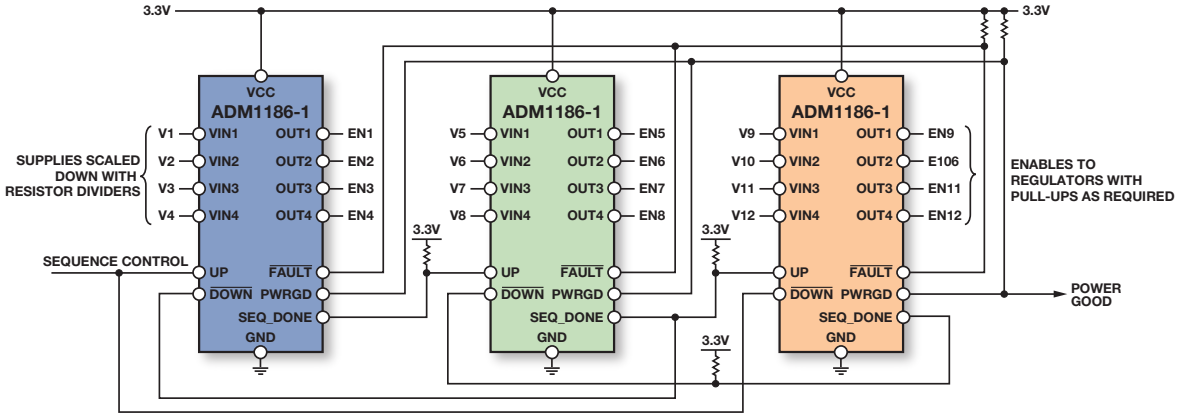
Features

- Monitors four supplies via ±0.8% accurate comparators
- Powered from 2.7 V to 5.5 V on the VCC pin
- Digital core supports up and down supply sequencing
- Multiple devices can be cascaded to support more than four supplies (ADM1186-1 only)
- Capacitor programmable sequencing time delays (5% accurate at +25°C)
- Four open-drain enable outputs and a power-good output
- Open-drain sequence complete and bidirectional fault pin (ADM1186-1 only)



APPLICATIONS

- Monitor and alarm functions
- Up and down power supply sequencing
- Telecommunications and data communications equipment
- PC/servers and notebooks



Multiple ADM1186-1 devices can be cascaded to provide controlled up and down sequencing for more than 4 channels. In this configuration the power-up sequencing is 1, 2, 3, 4, 5, 6 … 11, 12. The down sequencing is 12, 11, 10, 9, 8, 7 … 2, 1.

Part Number	Number of Supplies Monitored	Voltage Monitoring Accuracy (±%)	Number of Output Drivers	Sequencing		Active High Enable Output	Sequence Delay	Package	Price ($U.S.)[1]
				Up	Down				
ADM1184	4: cascadable	0.8	4	Yes	No	Open-drain	—	10-lead MSOP	2.39
ADM1185	4: cascadable	0.8	4	Yes	No	Open-drain	190 ms	10-lead MSOP	1.20
ADM1186-1	4: cascadable	0.8	4	Yes	Yes	Open-drain	Capacitor adj	20-lead QSOP	3.80
ADM1186-2	4	0.8	4	Yes	Yes	Open-drain	Capacitor adj	16-lead QSOP	2.98

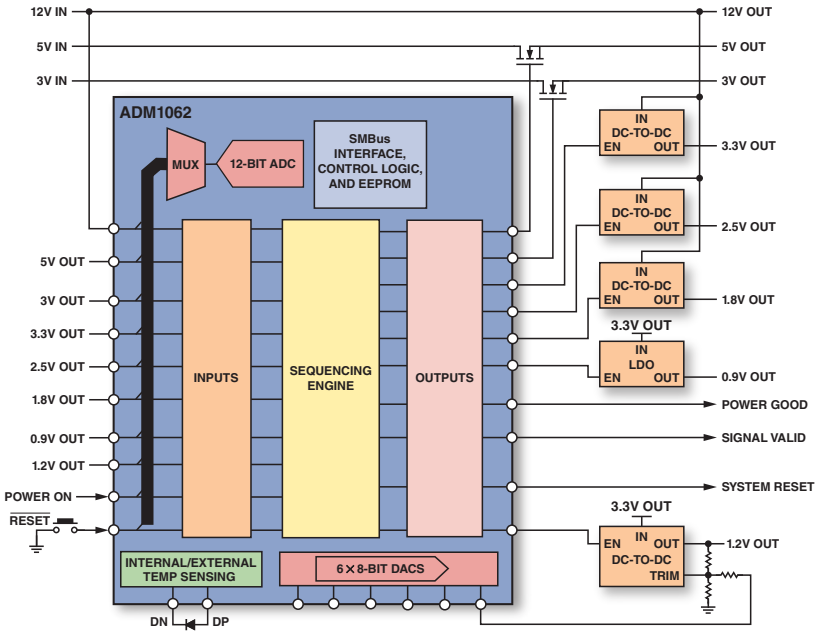
[1]1000 to 4999

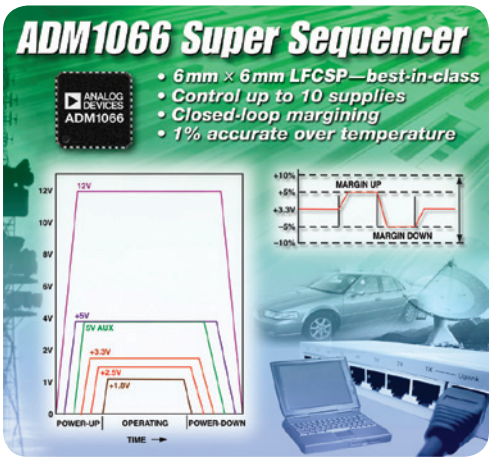
ANALOG DEVICES

ADM1062 to ADM1069: Highest Accuracy Super Sequencer Devices with Margining Control

ADI's Super Sequencer® family consists of configurable supervisory and sequencing devices that offer a single-chip solution for supply monitoring and sequencing in multisupply systems. The devices offer up to 10 programmable supply voltage monitor inputs, and ranges from 0.6 V to 14.4 V can be detected directly. Five of the inputs can also be configured as general-purpose logic inputs. There are up to 10 programmable outputs that can be configured as open-drain or FET drive, or pulled up to a specified voltage rail. An on-chip, 12-bit ADC allows readback of the supply voltages, offering an extra level of supply supervision. This can be used in a closed-loop system with four or six on-chip DACs for supply voltage adjustment, margining, and trimming. The ADM1062 to ADM1069 have flexible, programmable state machine-based sequencing engines. To store configuration parameters, 512 bytes of on-chip EEPROM are available. All configurations can be performed using the SMBus.

Functional Block Diagram





APPLICATIONS

- Central office systems
- Servers/routers
- Multivoltage system line cards
- DSP/FPGA supply sequencing
- In-circuit testing of margined supplies
- Base stations

Super Sequencer Devices Portfolio

Part Number	Number of Supplies Monitored	Voltage Monitoring Accuracy (±%)	Number of Output Drivers	Programming Method	FET Drive/ Enable Output	Voltage Readback	Supply Adj/ Margining	Package	Price ($U.S.)
ADM1060	7: cascadable	2.5	9	SMBus	Both	—	—	28-lead TSSOP	6.58
ADM1062	10: cascadable	1	10	SMBus	Both	12-bit ADC	12-bit ADC, 6 DACs	40-lead LFSCP, 48-lead TQFP	7.59
ADM1063	10: cascadable	1	10	SMBus	Both	12-bit ADC	—	40-lead LFSCP, 48-lead TQFP	8.35
ADM1064	10: cascadable	1	10	SMBus	Both	12-bit ADC	—	40-lead LFSCP, 48-lead TQFP	7.84
ADM1065	10: cascadable	1	10	SMBus	Both	—	—	40-lead LFSCP, 48-lead TQFP	5.82
ADM1066	12: cascadable	1	10	SMBus	Both	12-bit ADC	12-bit ADC, 6 DACs	40-lead LFSCP, 48-lead TQFP	8.60
ADM1067	10: cascadable	1	10	SMBus	Both	—	6 DACs	40-lead LFSCP, 48-lead TQFP	6.58
ADM1068	8: cascadable	1	8	SMBus	Both	—	—	32-lead LQFP	4.05
ADM1069	8: cascadable	1	8	SMBus	Both	12-bit ADC	12-bit ADC, 4 DACs	32-lead LQFP, 40-lead LFSCP	4.40

[1]1000 to 4999

Microprocessor Supervisory Cross References

Simple Reset/Power-On Reset	
Maxim	*ADI*
MAX6319	ADM6319
MAX6322	ADM6322
MAX6384	ADM6384
MAX6825	ADM6825
MAX825	ADM825
MXD1810	ADM1810
MXD1811	ADM1811
MXD1812	ADM1812
MXD1813	ADM1813
MXD1815	ADM1815
MXD1816	ADM1816
MXD1817	ADM1817
MXD1818	ADM1818
MAX6315	ADM6315
MAX6326	ADM6326 *New*
MAX6328	ADM6328 *New*
MAX6346	ADM6346 *New*
MAX6348	ADM6348 *New*
MAX6711	ADM6711
MAX6713	ADM6713
MAX698	ADM698
MAX707	ADM707
MAX708	ADM708
MAX709	ADM709
MAX803	ADM803
MAX809	ADM809
MAX810	ADM810
MAX811	ADM811
MAX812	ADM812

Watchdog Timers	
Maxim	*ADI*
MAX6316	ADM6316
MAX6318	ADM6318
MAX6320	ADM6320
MAX6321	ADM6321
MAX6821	ADM6821
MAX6822	ADM6822
MAX6823	ADM6823
MAX6824	ADM6824
MAX823	ADM823
MAX824	ADM824
DS1232	ADM1232
DS1232A	ADM1232A *New*
MAX699	ADM699
MAX705	ADM705
MAX706	ADM706

Multivoltage Supervisors	
Competitor	*ADI*
MAX6339	ADM6339 *New*
MAX6710	ADM6710 *New*
TPS3305	ADM13305 *New*
TPS3307	ADM13307 *New*
LTC2914	ADM2914 *New*

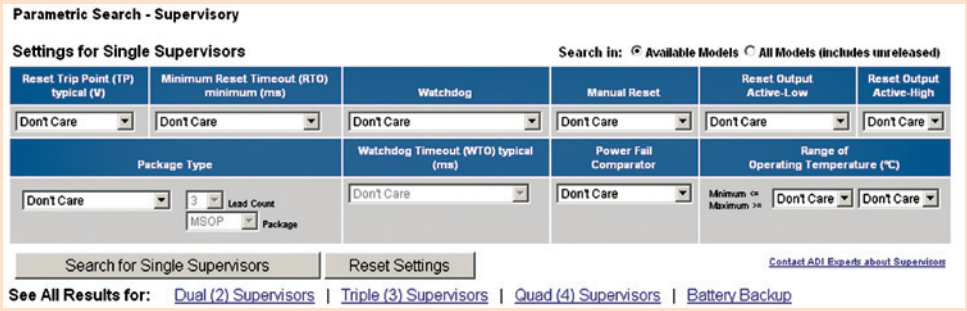
Battery Backup	
Maxim	*ADI*
MAX690	ADM690
MAX690A	ADM690A
MAX691	ADM691
MAX691A	ADM691A
MAX692	ADM692
MAX692A	ADM692A
MAX693	ADM693
MAX693A	ADM693A
MAX694	ADM694
MAX695	ADM695
MAX696	ADM696
MAX697	ADM697
MAX800	ADM800
MAX802	ADM802
MAX805	ADM805

Supervisory Parametric Search Tool

www.analog.com/supervisory-tool

The supervisory parametric search tool is an online tool that performs parametric searches on all ADI supervisory models, both those currently available and those that can be ordered.

Searches can be performed on trip points, reset timeouts, reset types, and other features.



For more information on ADI cross references, visit *www.analog.com/cross-reference*.

Supervisory—Simple Reset/Power-On Reset

Part Number	Reset Threshold (V)	Min Reset Timeout (ms)	Reset Output Stage		Manual Reset Capability	Supply Current Typ (µA)	Package	Price[1] ($U.S.)
			Active Low	Active High				
ADM1810	4.35, 4.62	100	Push-pull	—	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1811	4.35, 4.62	100	Internal pull-up	—	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1812	4.35, 4.62	100	—	Push-pull	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1813	4.35, 4.62	100	Internal pull-up	—	Yes	4	3-lead SC70, 3-lead SOT-23	0.39
ADM1815	2.18, 2.31, 2.55, 2.88, 3.06	100	Push-pull	—	No	4	3-lead SC70, 3-lead SOT-23	0.39
ADM1816	2.18, 2.31, 2.55, 2.88, 3.06	100	Internal pull-up	—	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1817	2.18, 2.31, 2.55, 2.88, 3.06	100	—	Push-pull	No	4	3-lead SC70, 3-lead SOT-23	0.45
ADM1818	2.18, 2.31, 2.55, 2.88, 3.06	100	Internal pull-up	—	Yes	4	3-lead SC70, 3-lead SOT-23	0.45
ADM6315	2.63, 2.93, 3.08, 4.39, 4.5, 4.63	1, 20, 140, 1120	Open-drain	—	Yes	4	4-lead SOT-143	0.73
ADM6319	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	Push-pull	Yes	5	5-lead SOT-23	0.50
ADM6322	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Open-drain	Push-pull	Yes	5	5-lead SOT-23	0.50
ADM6326	2.2, 2.32, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08	100	Push-pull	—	No	0.5	3-lead SOT-23	0.95
ADM6328	2.2, 2.32, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08	100	Open-drain	—	No	0.5	3-lead SOT-23	0.95
ADM6346	3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.38, 4.5, 4.63	100	Push-pull	—	No	1	3-lead SOT-23	0.95
ADM6348	3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.38, 4.5, 4.63	100	Open-drain	—	No	1	3-lead SOT-23	0.95
ADM6384	1.58, 1.67, 2.19, 2.31, 2.4, 2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	—	Yes	3	4-lead SC70	0.94
ADM6711	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	—	Yes	12	4-lead SC70	0.26
ADM6713	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	Yes	12	4-lead SC70	0.28
ADM6825	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	Yes	7	5-lead SOT-23	0.50
ADM698	4.65	140	Push-pull	Push-pull	No	600	8-lead PDIP, 16-lead SOIC	1.35
ADM707	4.65	160	Push-pull	Push-pull	Yes	190	8-lead PDIP, 8-lead SOIC	0.96
ADM708	4.4	160	Push-pull	Push-pull	Yes	190	8-lead PDIP, 8-lead SOIC, 8-lead MSOP	0.84
ADM709	2.63, 2.93, 3.08, 4.4, 4.65	140	Push-pull	—	No	35	8-lead PDIP, 8-lead SOIC	0.70
ADM803	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	No	17	3-lead SC70	0.26
ADM809	2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	140	Push-pull	—	No	17	3-lead SC70, 3-lead SOT-23	0.61
ADM810	2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	140	—	Push-pull	No	17	3-lead SC70, 3-lead SOT-23	0.60
ADM811	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull		Yes	5	4-lead SOT-143	0.45
ADM812	2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	—	Push-pull	Yes	5	4-lead SOT-143	0.45
ADM825	2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	Yes	5	5-lead SC70, 5-lead SOT-23	0.50
ADM8698	4.65	140	Push-pull	Push-pull	No	70	8-lead PDIP, 8-lead SOIC_N, 16-lead SOIC_W	1.99

[1]1000 to 4999

Low Power Comparators

Part Number	Number Per Package	Internal Reference	Reference Accuracy (±%)	Supply Voltage (V)	Supply Current (µA) Typ	Input Range (V)	Propagation Delay (µs) Typ	Hysteresis	Logic I/O	Package	Price[1] ($U.S.)
ADCMP341	2	Yes	0.275	1.7 to 5.5	6.5	0 to V_{CC}	10.0	Adj	Open-drain	8-lead SOT-23	0.90
ADCMP343	2	Yes	0.275	1.7 to 5.5	6.5	0 to V_{CC}	10.0	Adj	Open-drain	8-lead SOT-23	0.90
ADCMP350	1	Yes	3.5	2.25 to 5.5	10.0	0 to 22	5.0	Internal	Open-drain/ active low	4-lead SC70	0.31
ADCMP354	1	Yes	3.5	2.25 to 5.5	10.0	0 to 22	5.0	Internal	Open-drain/ active high	4-lead SC70	0.31
ADCMP356	1	Yes	3.5	2.25 to 5.5	10.0	0 to 22	5.0	Internal	Push-pull/ active high	4-lead SC70	0.31
ADCMP361	1	Yes	0.275	1.7 to 5.5	6.5	0 to V_{CC}	10.0	Internal	Open-drain	5-lead SOT-23	0.60
ADCMP370	1	No	—	2.25 to 5.5	4.0	0 to 22	5.0	Internal	Open-drain	5-lead SC70	0.28
ADCMP371	1	No	—	2.25 to 5.5	4.0	0 to 22	5.0	Internal	Push-pull	5-lead SC70	0.28
ADCMP670	2	Yes	1.50	1.7 to 5.5	5.7	0 to V_{CC}	10.0	Internal	Open-drain	6-lead TSOT	1.40
CMP04	4	No	—	5	800.0	0 to V_{CC} – 1.5	1.3	—	Open-collector	14-lead SOIC	4.75
ADM1184	4	Yes	0.8	2.7 to 5.5	80	0 to V_{CC}	30.0	Fixed	Open-drain	10-lead MSOP	2.39
ADM2914	8	Yes	1.5	2.3 to shunt	62	0 to V_{CC}	125	Internal	Open-drain	16-lead QSOP	3.99
ADM12914	8	Yes	0.8	2.3 to shunt	62	0 to V_{CC}	125	Internal	Open-drain	16-lead QSOP	4.99

[1]1000 to 4999

Supervisory—Watchdog Timers

Part Number	Reset Threshold (V)	Min Reset Timeout (ms)	Reset Output Stage		Manual Reset Capability	Typ Watchdog Timeout (ms)	Power-Fail Indicator	Package	Price[1] ($U.S.)
			Active Low	Active High					
ADM1232, ADM1232A	4.37, 4.62	250	Open-drain	Push-pull	Yes	150/600/1120	No	8-lead PDIP, 8-lead SOIC, 16-lead SOIC_W, 8-lead MSOP	0.94
ADM6316	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	—	Yes	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6318	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Push-pull	Push-pull	No	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6320	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Open-drain	—	Yes	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6321	2.5, 2.63, 2.7, 2.8, 2.93, 3.0, 3.08, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.39, 4.5, 4.63, 4.7, 4.8, 4.9, 5.0	1, 20, 140, 1120	Open-drain	Push-pull	No	6.3/102/1600/ 25,600	No	5-lead SOT-23	0.50
ADM6821	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	—	Push-pull	Yes	1600	No	5-lead SOT-23	0.75
ADM6822	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	Yes	1600	No	5-lead SOT-23	0.75
ADM6823	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	—	Yes	1600	No	5-lead SOT-23	0.75
ADM6824	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	No	1600	No	5-lead SOT-23	0.75
ADM699	4.65	140	Push-pull	Push-pull	No	1600	No	8-lead PDIP, 16-lead SOIC	1.66
ADM705	4.65	160	Push-pull	—	Yes	1600	Yes	8-lead PDIP, 8-lead SOIC	1.01
ADM706	4.4	160	Push-pull	—	Yes	1600	Yes	8-lead PDIP, 8-lead SOIC	1.68
ADM823	2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	—	Yes	1600	No	5-lead SC70, 5-lead SOT-23	0.50
ADM824	2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	140	Push-pull	Push-pull	Yes	1600	No	5-lead SC70, 5-lead SOT-23	0.50
ADM8616	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	1, 20, 140, 1120	Push-pull	—	No	6.3/102/1600	No	4-lead SC70	0.85
ADM8617	1.58, 1.67, 2.19, 2.32, 2.63, 2.93, 3.08, 4.38, 4.63	1, 20, 140, 1120	Open-drain	—	No	6.3/102/1600	No	4-lead SC70	0.85
ADM8699	4.65	140	Push-pull	Push-pull	No	1600	No	8-lead PDIP, 8-lead SOIC_N, 16-lead SOIC_W	1.99
ADM9690	4.31	10 typ, 50 typ	Push-pull	—	No	0.75/1.5/ 12.5/25	No	8-lead SOIC	1.50
ADM13305	0.6 (adj), 1.68, 2.25, 2.93, 4.55	140	Push-pull	Push-pull	Yes	1600	No	8-lead SOIC_N	0.95

[1]1000 to 4999

Multivoltage Supervisors

Part Number	Number of Monitored Voltages	Reset Threshold (V)	Min Reset Timeout (ms)	Reset Output Stage		Manual Reset Capability	Typ Watchdog Timeout (ms)	Package	Price ($U.S.)[1]
				Active Low	Active High				
ADM13305	2	0.6 (adj), 1.68, 2.25, 2.93, 4.55	140	Push-pull	Push-pull	Yes	1600	8-lead SOIC_N	0.95
ADM13307	3	0.6 (adj), 1.25 (adj), 1.68, 2.25, 2.93, 4.55	140	Push-pull	Push-pull	Yes	—	8-lead SOIC_N	0.98
ADM6710	3 or 4	0.62 (adj), 1.58, 1.67, 2.19, 2.32, 2.63, 2.78, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	No	—	6-lead SOT-23	1.60
ADM1184	4	0.6 (adj)	100	Open-drain	—	No	—	10-lead MSOP	2.39
ADM6339	4	–0.50 (adj), 0.62 (adj), 1.23 (adj), –4.38, –4.63, 1.58, 2.19, 2.63, 2.78, 2.93, 3.08, 4.38, 4.63	140	Open-drain	—	No	—	6-lead SOT-23	1.79
ADM2914	4	0.5 (adj)	Adj	Open-drain	—	—	—	16-lead QSOP	3.99
ADM12914	4	0.5 (adj)	Adj	Open-drain	—	—	—	16-lead QSOP	4.99

[1]1000 to 4999

Analog Sequencers

Part Number	Number of Supplies Monitored	Voltage Monitoring Accuracy (±%)	Number of Output Drivers	FET Drive/Enable Output	Sequencing	Package	Price ($U.S.)
ADM1085	1: cascadable	7	1	Enable	Up	6-lead SC70	0.34
ADM1086	1: cascadable	8	1	Enable	Up	6-lead SC70	0.34
ADM1087	1: cascadable	8	1	Enable	Up	6-lead SC70	0.34
ADM1184	4: cascadable	0.8	4	Enable	Up	10-lead MSOP	2.42
ADM1185	4: cascadable	0.8	4	Enable	Up	10-lead MSOP	1.21
ADN1186-1	4: cascadable	0.8	4	Enable	Up and down	20-lead QSOP	3.85
ADM1186-2	4	0.8	4	Enable	Up and down	16-lead QSOP	3.02
ADM6819	2: cascadable	2.6	1	FET drive	Up	6-lead SOT-23	1.21
ADM6820	2: cascadable	2.6	1	FET drive	Up	6-lead SOT-23	1.21

Digital Sequencers

Part Number	Number of Supplies Monitored	Voltage Monitoring Accuracy (±%)	Number of Output Drivers	Programming Method	FET Drive/Enable Output	Voltage Readback	Supply Adj/Margining	Package	Price ($U.S.)
ADM1060	7: cascadable	2.5	9	SMBus	Both	—	—	28-lead TSSOP	6.58
ADM1062	10: cascadable	1	10	SMBus	Both	12-bit ADC	12-bit ADC, 6 DACs	40-lead LFSCP, 48-lead TQFP	7.59
ADM1063	10: cascadable	1	10	SMBus	Both	12-bit ADC	—	40-lead LFSCP, 48-lead TQFP	8.35
ADM1064	10: cascadable	1	10	SMBus	Both	12-bit ADC	—	40-lead LFSCP, 48-lead TQFP	7.84
ADM1065	10: cascadable	1	10	SMBus	Both	—	—	40-lead LFSCP, 48-lead TQFP	5.82
ADM1066	12: cascadable	1	10	SMBus	Both	12-bit ADC	12-bit ADC, 6 DACs	40-lead LFSCP, 48-lead TQFP	8.60
ADM1067	10: cascadable	1	10	SMBus	Both	—	6 DACs	40-lead LFSCP, 48-lead TQFP	6.58
ADM1068	8: cascadable	1	8	SMBus	Both	—	—	32-lead LQFP	4.05
ADM1069	8: cascadable	1	8	SMBus	Both	12-bit ADC	12-bit ADC, 4 DACs	32-lead LQFP, 40-lead LFSCP	4.40

ANALOG DEVICES

Analog Devices in Power Management

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Product Categories

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- Switching regulators
- Low dropout regulators
- Digital power
- Portable and low power solutions
- Supervisory
- Sequencing
- Hot swap
- High speed drivers
- Power monitors

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In addition to providing world-class products, ADI takes great pride in offering design engineers the very best in online design tools. These tools have been specifically designed to provide power designers and nonpower designers alike the tools needed to design, optimize, and implement the very best power circuits available.

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Web-Based Online Tools

- ADIsimPower: dc-to-dc power management tool
- Supervisory parametric search tool

Downloadable Excel-Based Tools

- ADI linear regulator parametric search and design
- ADP161x boost design tool
- ADP1864 buck design tool
- ADP2503/ADP2504 buck-boost switching regulator design tool
- ADP210x switching regulator design tool
- ADP2108 dc-to-dc buck design tool
- ADI supervisor parametric search and cross reference

World-Class Support

ADI's commitment to our customers' success goes well beyond just parts and tools. ADI provides the very best technical support to our customers. To help address the design needs of our expansive list of customers around the world, ADI has strategically located power development and design centers in key regions (North America, Europe, China, Japan). These regional power design centers enable ADI to react quicker and more efficiently to customer specific design needs and questions, allowing them to get their product to market faster.

For a complete listing of ADI products and online tools, go to *www.analog.com/power*.

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